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Avalanche Notes

U.S. Forest Service
Westwide Avalanche Network

MARCH 1991

The long-wave weather pattern over North America began changing at the end of February, and the change persisted through March. A long-wave trough replaced the ridge that had been entrenched for months over the West, and embedded in the trough was a series of Pacific storms that brought a dramatic end to the drought that had plagued, especially, the Sierra of California and the Sawtooth Range of Idaho.

Four storms hit the Sierra: the 1st-5th, 11th-15th, 18th-21st, and 24th-27th. Mammoth Mtn received 59" of snow on the 1st-5th, and Sugar Bowl got 66" on the 1st-3rd. On the 4th, Alpine Meadows recorded 8 hours of sustained winds of 120 mph, and Squaw Valley recorded a gust to 160 mph. On the 18th-19th Mammoth got 44" of new snow, and on the 24th-26th, Sugar Bowl got 71" while Alpine Meadows got 62". For the month, Alpine Meadows received almost 25" of water equivalent and wound up with 280% of normal snowfall while Mammoth got 250%, and Squaw Valley, 230%. For Sugar Bowl and Alpine Meadows, it was their greatest-ever one-month snowfall in more than 20 years of recordkeeping.

In the Cascades of Washington, Crystal Mtn reached 150% of normal snowfall while Mt. Rainier-Paradise got 140% and Stevens Pass, 100%. The largest storm was on the 2nd-6th when 65" fell at Mt. Rainier, 43" at Snoqualmie Pass, and 38" at Crystal Mtn. Mt. Hood Meadows, OR got missed by the big storms and ended the month with 90% of normal snows, while Alyeska, AK was north of the storm track and received 85%.

In the Intermountain region, most sites received steady, light snows all month. Jackson Hole, WY recorded 126% of normal; Bridger Bowl, MT, 115%; Snowbird, UT, 97%; and Big Mtn, MT, 96%. Solitude, UT had measurable snow on 26 days of the month. Somehow, Big Sky, MT got skipped and recorded only 83% of normal. But Sun Valley, ID did not get skipped: helped by 25" on the 4th-5th, Sun Valley received 210% of normal, its second largest March snowfall of record.

The Pacific storms held together across the Great Basin and brought above-normal snows to all sites in Colorado and record snows to many. Steady, light doses of snow all month were the rule, but a few big dumps fell also. For example, Wolf Creek got 33" on the 1st-2nd, and on the 6th, Winter Park/Mary Jane got 27" and Vail, 23". For the month, Gothic got 230% of normal; Crested Butte, 200%; Wolf Creek, 175%; Aspen Mtn and Copper Mtn, 170%; Purgatory, Monarch, Beaver Creek, and Winter Park, all 160%; Berthoud Pass and Vail, 155%; Aspen Highlands, Sunlight, and Winter Park/Mary Jane, 140%; Red Mtn Pass and Telluride, 130%; and Breckenridge, 100%. The following sites received their heaviest March snows of record: Gothic, Crested Butte, Wolf Creek, Aspen Mtn, Beaver Creek, Vail, Sunlight, Winter Park/Mary Jane.

With the heavy and widespread snows, March was by far the busiest month for avalanches this winter. All mountain ranges in all regions of the West experienced avalanche cycles at one time or another in March. After all, the snows of March mostly fell on shallow, weak snow covers that were incapable of handling the stress. Note that Alpine Meadows reported almost 600 avalanches, numbers reminiscent of winters past.

Twenty-six avalanche incidents were reported in March. Several were notable and two caused deaths, the sixth and seventh of the season. In chronological order: On the 3rd and 4th, snowcats were caught by slides at Kirkwood Meadows and Squaw Valley, CA, respectively. On the 6th at Snowmass, CO, a patroller was injured when caught -- out for the season. Also on the 6th during a period of extreme hazard around Ashcroft, CO (near Aspen), a woman ski tourer was buried and killed in a huge avalanche that had released naturally more than 2,000 feet above her. Many others witnessed the half-mile-wide avalanche. Rescuers recovered her body two days later. This avalanche followed a similarly-large slide on the 5th in an adjacent valley that narrowly missed a party of six snowmobilers.

On the 17th on Loveland Pass, CO, two men riding hard-plastic sleds down a gully triggered and were buried by an avalanche. One survived, but the second did not. He was buried 5 feet deep for 20 minutes. He thus became the fifth person to die by avalanche in Colorado and the seventh in the U.S. this season.

Lastly on the 29th, a snowmobiler near Snoqualmie Pass, WA collapsed a cornice, fell onto the steep slope beneath, and triggered a shallow avalanche. The victim suffered a broken ankle and other injuries in the fall.

In March, a total of 33 people were reported caught, 11 partly buried, 3 buried, 3 injured, and 2 killed. For the season, there have been a total of 97 incidents which have caught 116, partly buried 32, buried 15, injured 9, and killed 7. Additionally, eight vehicles have been caught and two lightly damaged. Two buildings have sustained slight damage.

U.S. FOREST SERVICE
ALPINE SNOW AND AVALANCHE RESEARCH PROJECT
RM STATION FORT COLLINS, COLO.

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SUMMARY OF WEATHER AND SNOW CONDITIONS

AREA	SNOWFALL				WATER EQUIVALENT				SNOW DEPTH				TEMPERATURE				WIND SPEED AND DIRECTION			
	TOTAL SNOW- FALL IN.	MAX IN 24 HR.	D T E		TOTAL WATER IN.	MAX IN 24 HR.	D T E	NUMBER OF DAYS GE GE GE 1.0	MAX IN.	D T E	MIN IN.	AVG IN.	MEAN MAX DEGREES	MIN DEGREES	AVG	AVG FOR MO. MPH	6 HOUR PERIODS GE GE GE 20	FASTEST HOUR MPH	FASTEST HOUR DIR.	D T E
CENTRAL AND SOUTHERN																				
ROCKY MOUNTAINS																				
ASPEN HIGHLANDS, CO	72.4	03	15	6	5.5	1.0	6	3	70	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
BEAR LAKE, RMNP, CO	84.8	07	18	27	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
BEAVER CREEK, CO	100.0	07	19	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
BRECKENRIDGE, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
COPPER MINE, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
CRESTED BUTTE, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
GOTHIC, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
WINTER PARK, S.A., CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
MONARCH, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
PURGATORY, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
RED MOUNTAIN PASS, U.S. 550	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SUNLIGHT, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
TELLURIDE, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
VALE, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
WINTER PARK, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
WOLF CREEK, CO	83.0	07	18	6	5.5	1.0	6	3	55	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
INTERMOUNTAIN																				
BIG MOUNTAIN, MONT	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
BIG SKY, MONT	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
BRIAR CREEK, MONT	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
JACKSON HOLE, WYO	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
PARK MOUNTAIN, ID	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SCHWEIZER, ID	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SNOBIR, ID	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SUN VALLEY, ID	43.0	08	19	4	3.7	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
WEST COAST																				
ALPINE MOUNTAINS, CAL	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
ALPINE MOUNTAINS, CAL	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
CRYSTAL MOUNTAIN, MASH	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
CRYSTAL MOUNTAIN, MASH	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
HEAVENLY MOUNTAIN, CAL	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
MAMMOTH MOUNTAIN, CALIF	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
MT. HOOD MOUNTAIN, ORE	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
MT. RAINIER, WASH	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SNOQUALMIE PASS, WASH	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SQUAW VALLEY, CALIF	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
STEVENSON PASS, MASH	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260
SUGAR BOWL, CALIF	63.0	10	22	1	6.0	1.0	6	3	60	11	4	6	3.0	10.0	7.0	10.0	6	1	26	260

-- DATA INCOMPLETE OR MISSING--IF AVERAGE VALUE IS ENTERED, LESS THAN 10 DAYS RECORD IS MISSING
M--ONE OR MORE DAYS OF RECORD MISSING--IF WIND SPEED COLUMN, LESS THAN 37 6-HOUR PERIODS ARE MISSING
GE--GREATER THAN OR EQUAL TO

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AVALANCHE SUMMARY

AREA	TOTAL		DATES OF		NUMBER OF DAYS WITH		TYPE OF AVALANCHE				FRACTURE LINE HEIGHTS IN FEET		VERTICAL DESCENT IN FEET				AVALANCHES ACROSS MAJOR ROADS NO.
	A	V	F	L	A	S	N	A	H	S	GE	GE	GE	GE	GE	GE	
	A	V	F	L	A	S	N	A	H	S	200	500	1000	1500	2000	2500	
	THIS MONTH NO.	THIS WINTER NO.	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
CENTRAL AND SOUTHERN ROCKY MOUNTAINS																	
ASPEN HIGHLANDS, COLO	55	149	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
ASPEN MOUNTAIN, COLO	11	11	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
ASPEN SNOWMASS, COLO	61	161	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
BERTHOUD PASS, U.S. 40	13	46	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
BRECKENRIDGE, COLO	19	83	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
BRECKENRIDGE, COLO	27	170	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
COTUITIC, COLO	11	23	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
LOVELAND BASIN, COLO	11	43	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
LOVELAND PASS, U.S. 6	11	33	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
MONARCH, COLORADO	11	33	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
RED MTN. PASS, U.S. 550	11	33	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
STEAMBOAT SPRNGS, CO	15	81	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
TELLURIDE, COLO	15	15	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
URAD MINE, COLO	15	15	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
VAIL, COLO	15	15	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
WOLF CREEK, COLO	44	151	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
INTERMOUNTAIN																	
BIG MOUNTAIN, MONT	12	109	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
BIG SKY, MONT	13	288	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
BRIDGER BOWL, MONT	17	44	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
JACKSON HOLE, WYO	17	137	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
PARK WEST, UTAH	12	137	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
SOLITUDE, UTAH	11	338	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
SUN VALLEY, IDAHO	17	17	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
SNOWBIRD, UTAH	246	714	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
WEST COAST																	
ALPINE MEADOWS, CAL	58	64	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
ALPINE, ALASKA	38	148	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
CRYSTAL MTN, WASH	130	10	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
HERVENLY VALLEY, CAL	23	10	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
KIRKWOOD, CALIF	36	256	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
MAMMOTH MTN, CALIF	51	206	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
MT. HOOD MEADOWS	8	206	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
SNOWMASS PASS, I-90	19	266	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
SQUAW VALLEY, WASH	28	266	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
STEVENS PASS, U.S. 2	35	100	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0
SUGAR BOWL, CALIF	230	230	1	2	1	2	1	2	1	2	1	2	1	2	1	2	0

--=DATA INCOMPLETE OR MISSING
GE=GREATER THAN OR EQUAL TO
+=ALSO OCCURRED ON OTHER DATES